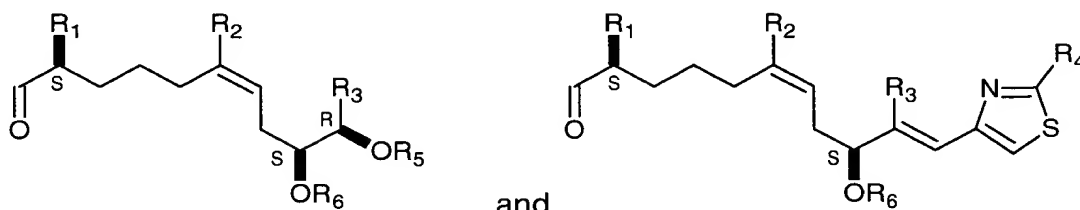


**I claim:**

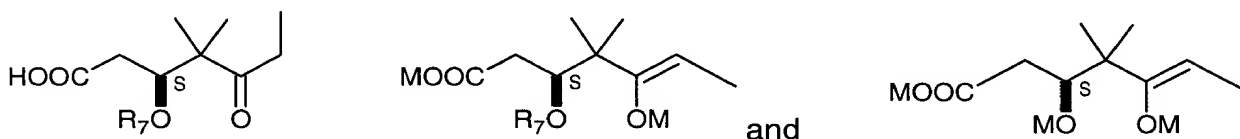
1. A method for use in producing epothilones and analogs and derivatives thereof, comprising:

(a) performing an aldol condensation of a first compound selected from the formulas:



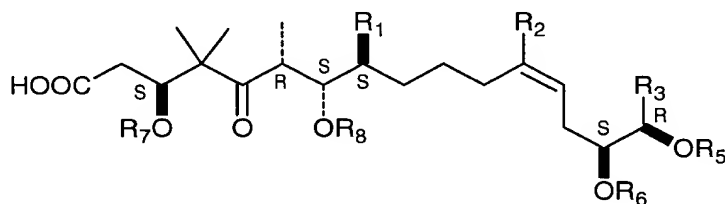
and

and stereoisomers thereof, with a second compound selected from the formulas:

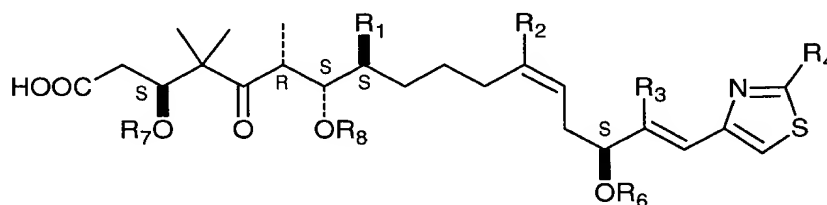


and

and stereoisomers thereof, thereby to form a third compound selected from the formulas:

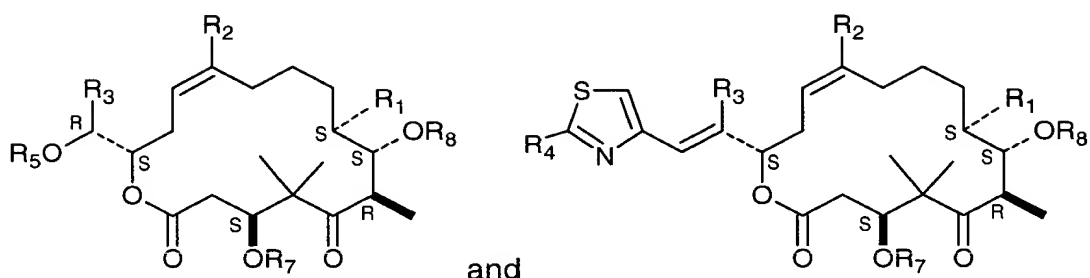


and



and stereoisomers thereof, wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub> and R<sub>8</sub> are each selected from H and a protecting group; and wherein M is an alkali metal; and

(b) performing a macrolactonization of the third compound thereby to form a fourth compound selected from the formulas:



and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_5$ ,  $R_7$  and  $R_8$  are each selected from H and a protecting group.

2. A method according to claim 1 wherein  $R_1$ ,  $R_3$  and  $R_4$  are each methyl, and  $R_2$  is H or methyl.

3. A method according to claim 2 wherein  $R_2$  is H.

4. A method according to claim 2 wherein  $R_2$  is methyl.

5. A method according to claim 2 wherein at least one of  $R_5$  -  $R_8$  is TBS.

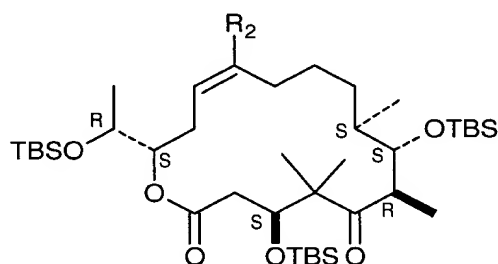
6. A method according to claim 2 wherein  $R_6$ ,  $R_7$  and  $R_8$  are each TBS.

7. A method according to claim 2 wherein  $R_5$  is PMB.

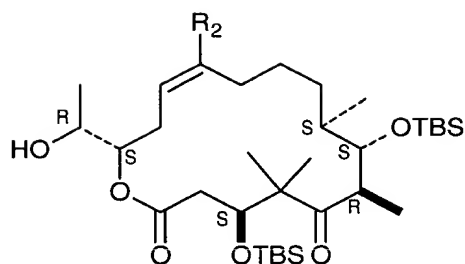
8. A method according to claim 2 wherein  $R_6$  is SEM.

9. A method according to claim 1 wherein  $R_5$  is selected from PMB, DPS and TBS; wherein  $R_6$  is selected from H, TBS, TMS, TIPS, PMBM and SEM; wherein  $R_7$  is selected from H, TBS, TROC,  $-\text{CO}(\text{CH}_2)_4\text{CH}_3$  and  $-\text{CO}(\text{CH}_2)_3\text{CH}=\text{CH}_2$ ; and wherein  $R_8$  is selected from H and TBS.

10. A method according to claim 1 wherein said fourth compound is of a formula selected from:

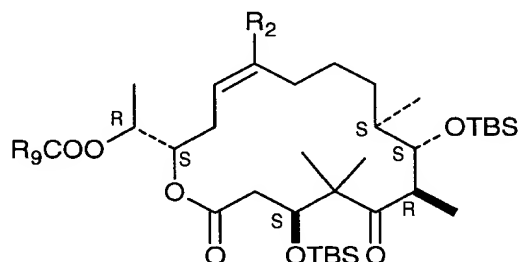


and stereoisomers thereof, where  $R_2$  is H or methyl; and wherein said fourth compound is converted to a fifth compound of a formula selected from:



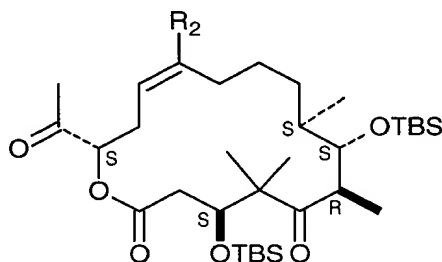
and stereoisomers thereof, where  $R_2$  is H or methyl.

11. A method according to claim 10 wherein said fifth compound is converted to a sixth compound of a formula selected from:



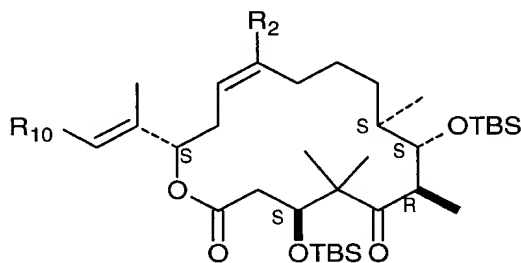
and stereoisomers thereof, where  $R_2$  is H or methyl and wherein  $R_9$  is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof.

12. A method according to claim 10 wherein said fifth compound is converted to a sixth compound of a formula selected from:



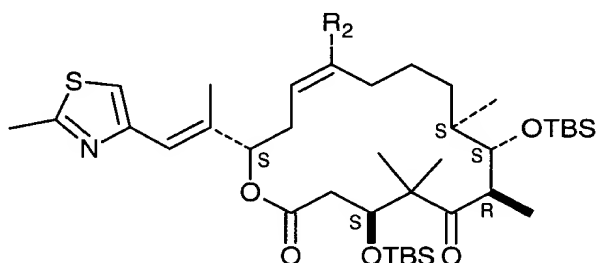
and stereoisomers thereof, where  $R_2$  is H or methyl.

13. A method according to claim 12 wherein said fifth compound is converted to a sixth compound of a formula selected from:



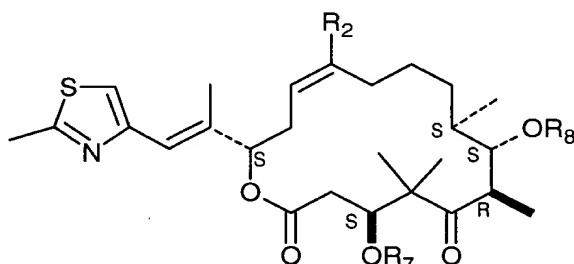
and stereoisomers thereof, where  $R_2$  is H or methyl and wherein  $R_{10}$  is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof.

14. A method according to claim 13 wherein said sixth compound is of a formula selected from:



and stereoisomers thereof, where  $R_2$  is H or methyl.

15. A method according to claim 1 wherein said fourth compound is of a formula selected from:

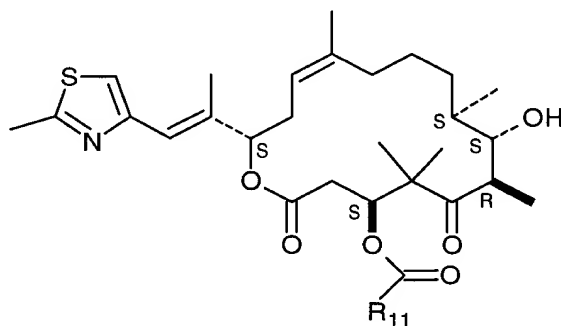


and stereoisomers thereof, where  $R_2$  is H or methyl,  $R_7$  is H or TBS, and  $R_8$  is H, TBS, or TROC.

16. A method according to claim 15 wherein said fourth compound is further converted to Epothilone B.

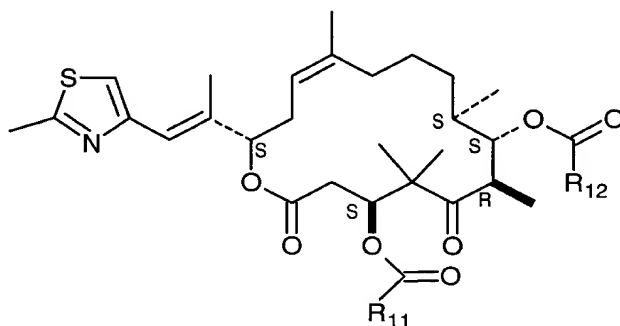
17. A method according to claim 15 wherein  $R_7$  and  $R_8$  each are H.

18. A method according to claim 17 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



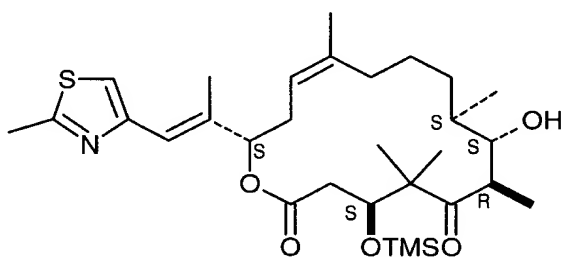
and stereoisomers thereof, wherein  $R_{11}$  is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

19. A method according to claim 18 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



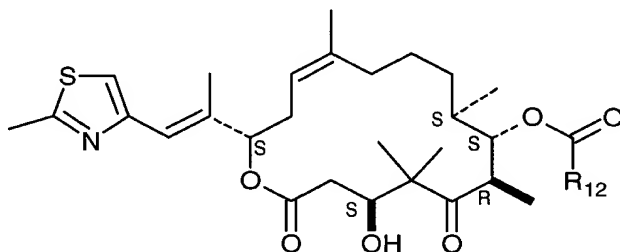
and stereoisomers thereof, wherein  $R_{11}$  and  $R_{12}$  are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

20. A method according to claim 17 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



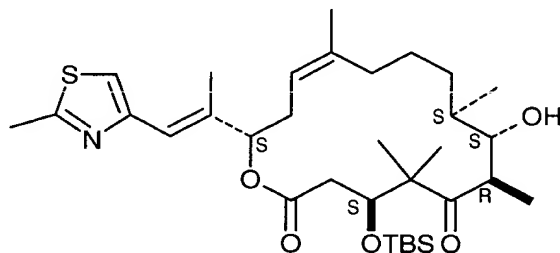
and stereoisomers thereof.

21. A method according to claim 20 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



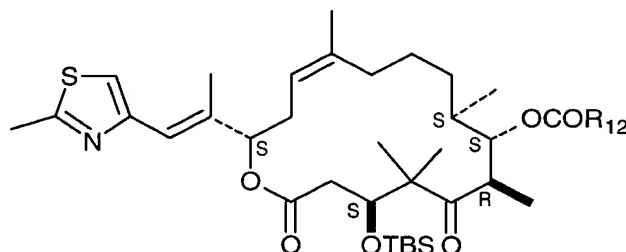
and stereoisomers thereof, wherein  $R_{12}$  is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

22. A method according to claim 15 wherein  $R_7$  is TBS and  $R_8$  is TROC.
23. A method according to claim 22 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



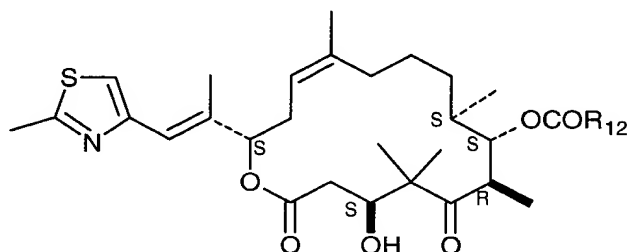
and stereoisomers thereof.

24. A method according to claim 23 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



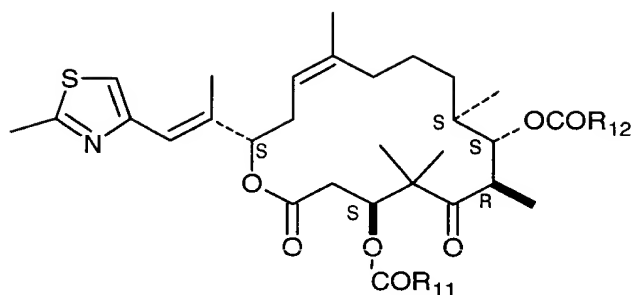
and stereoisomers thereof, wherein  $R_{12}$  is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

25. A method according to claim 24 wherein said sixth compound is further converted to a seventh compound of a formula selected from:



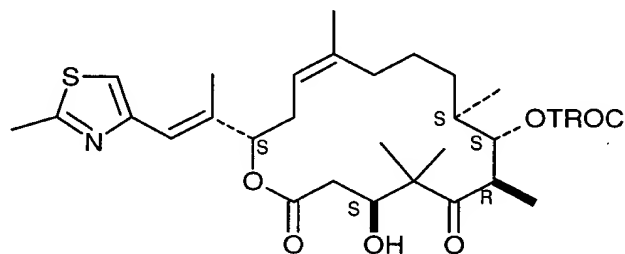
and stereoisomers thereof, wherein  $R_{12}$  is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

26. A method according to claim 25 wherein said seventh compound is further converted to an eighth compound of a formula selected from:



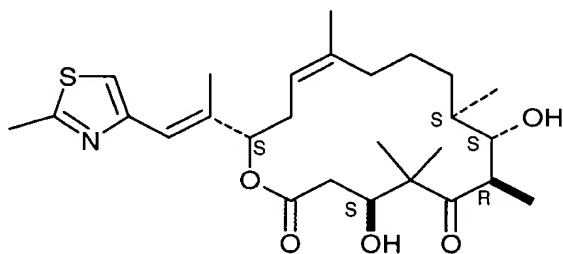
and stereoisomers thereof, wherein  $R_{11}$  and  $R_{12}$  are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

27. A method according to claim 22 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



and stereoisomers thereof.

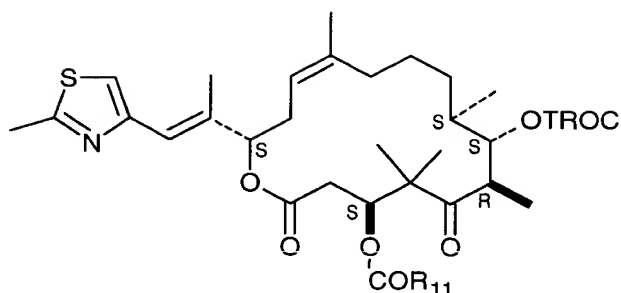
28. A method according to claim 27 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



and stereoisomers thereof.

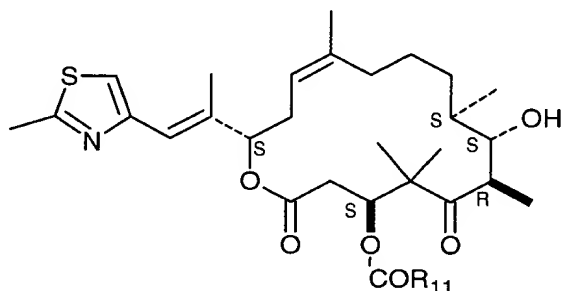
29. A method according to claim 28 wherein said sixth compound is further converted to Epothilone B.

30. A method according to claim 27 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



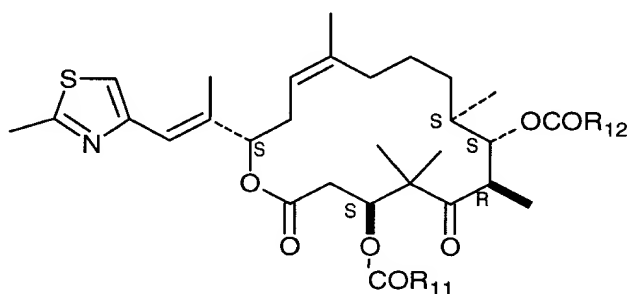
and stereoisomers thereof, wherein  $R_{11}$  is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

31. A method according to claim 30 wherein said sixth compound is further converted to a seventh compound of a formula selected from:



and stereoisomers thereof, wherein  $R_{11}$  is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

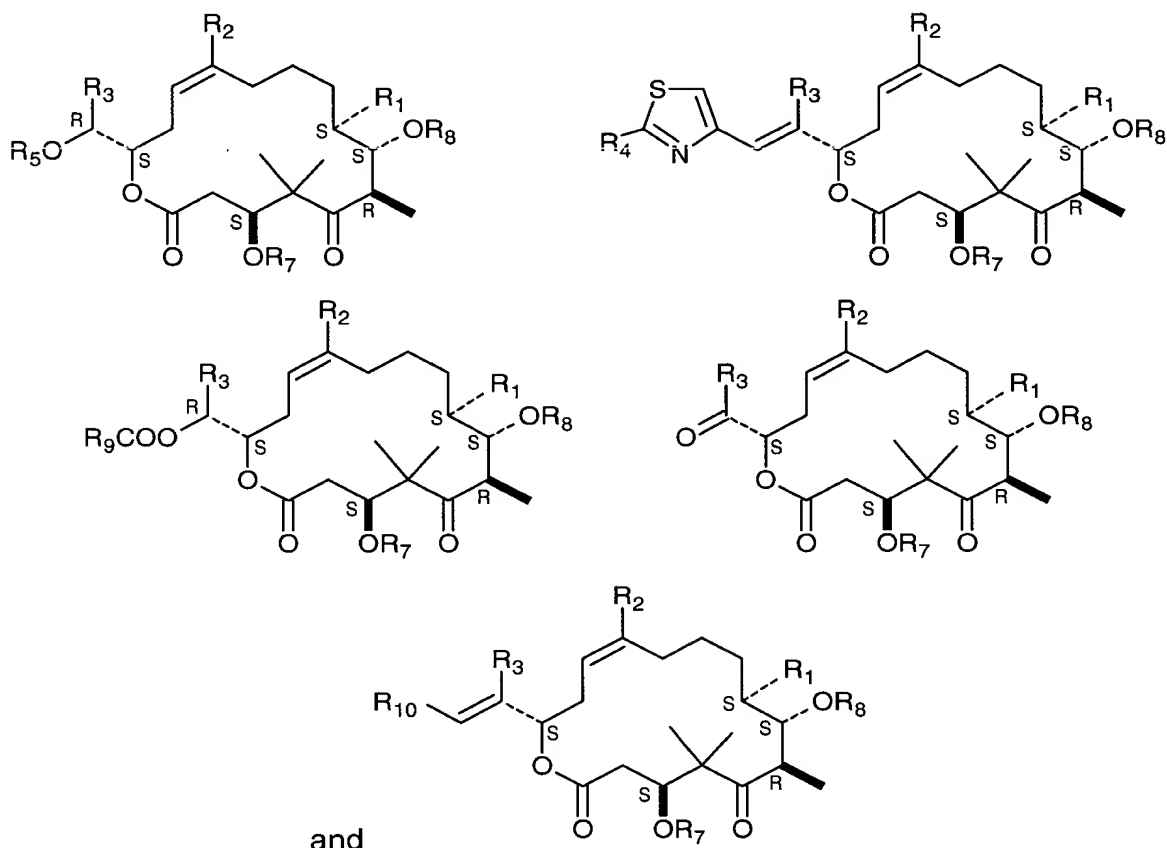
32. A method according to claim 31 wherein said seventh compound is further converted to an eighth compound of a formula selected from:



and stereoisomers thereof, wherein  $R_{11}$  and  $R_{12}$  are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

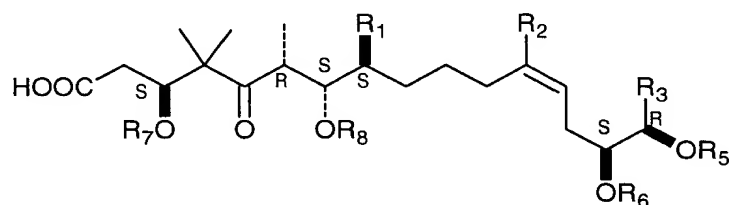
33. A chemical compound formed according to the method of claim 1.

34. A chemical compound according to claim 33 wherein said compound is selected from the formulas:

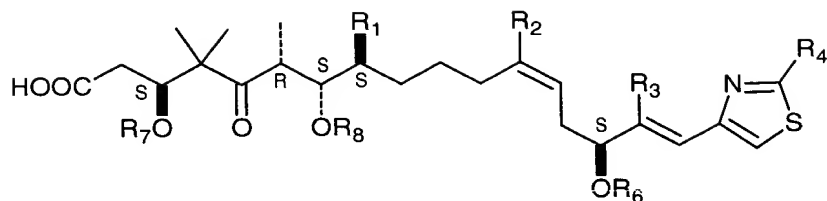


and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein  $R_5$  and  $R_6$  are each selected from H and a protecting group; wherein  $R_7$  is selected from H, a protecting group and  $COR_{11}$ ; wherein  $R_8$  is selected from H, a protecting group and  $COR_{12}$ ; wherein  $R_9$  is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein  $R_{10}$  is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_{11}$  and  $R_{12}$  are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

35. A chemical compound having a formula selected from:



and



and stereoisomers thereof, wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub> and R<sub>8</sub> are each selected from H and a protecting group.

36. A chemical compound according to claim 35 wherein R<sub>1</sub>, R<sub>3</sub> and R<sub>4</sub> are each methyl, and R<sub>2</sub> is H or methyl.

37. A chemical compound according to claim 36 wherein R<sub>2</sub> is H.

38. A chemical compound according to claim 36 wherein R<sub>2</sub> is methyl.

39. A chemical compound according to claim 36 wherein at least one of R<sub>5</sub> - R<sub>8</sub> is TBS.

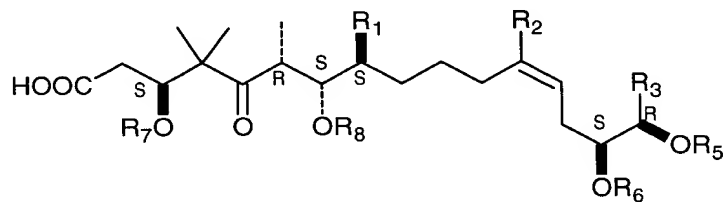
40. A chemical compound according to claim 36 wherein R<sub>6</sub>, R<sub>7</sub> and R<sub>8</sub> are each TBS.

41. A chemical compound according to claim 36 wherein R<sub>5</sub> is PMB.

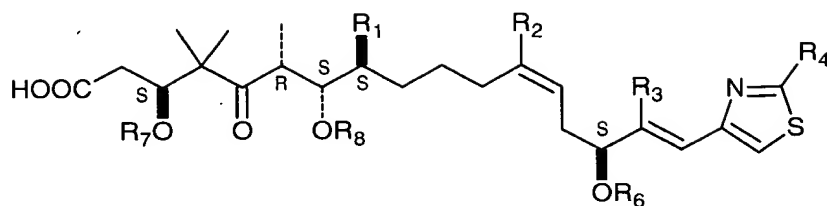
42. A chemical compound according to claim 36 wherein R<sub>6</sub> is SEM.

43. A chemical compound according to claim 35 wherein R<sub>5</sub> is selected from PMB, DPS and TBS; wherein R<sub>6</sub> is selected from H, TBS, TMS, TIPS, PMBM and SEM; wherein R<sub>7</sub> is selected from H, TBS, TROC, and -CO(CH<sub>2</sub>)<sub>4</sub>CH<sub>3</sub>; and wherein R<sub>8</sub> is selected from H, TBS and TROC.

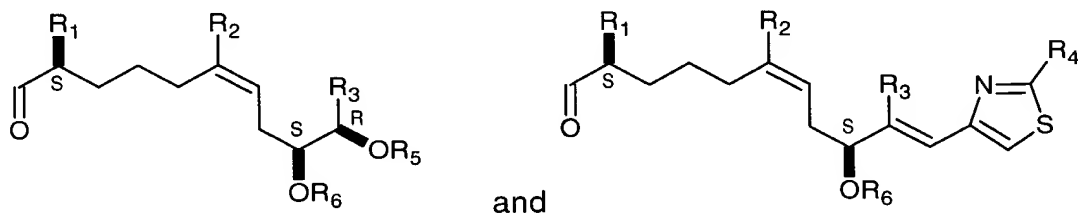
44. A method for producing a chemical compound having a formula selected from



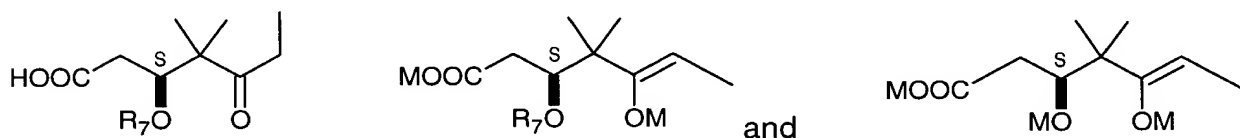
and



and stereoisomers thereof, which is useful in producing epothilones and analogs and derivatives thereof, comprising performing an aldol condensation of a first compound selected from the formulas:



with a second compound selected from the formulas:



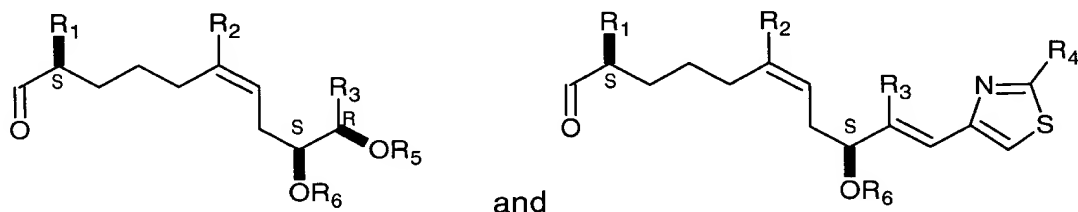
wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein  $R_5$ ,  $R_6$ ,  $R_7$  and  $R_8$  are each selected from H and a protecting group; and wherein M is an alkali metal.

45. A method according to claim 44 wherein M is Li.

46. A method according to claim 44 wherein  $R_1$ ,  $R_3$  and  $R_4$  are each methyl and wherein  $R_2$  is H or methyl.

47. A method according to claim 44 wherein  $R_5$  is selected from PMB, DPS and TBS; wherein  $R_6$  is selected from H, TBS, TMS, TIPS, PMBM and SEM; wherein  $R_7$  is selected from H, TBS, TROC, and  $-\text{CO}(\text{CH}_2)_4\text{CH}_3$ ; and wherein  $R_8$  is selected from H, TBS and TROC.

48. A chemical compound having a formula selected from:



and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_5$  and  $R_6$  are each selected from H and a protecting group.

49. A chemical compound according to claim 48 wherein  $R_1$ ,  $R_3$  and  $R_4$  are each methyl and wherein  $R_2$  is H or methyl.

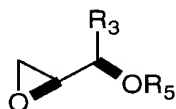
50. A chemical compound according to claim 48 wherein  $R_5$  is selected from PMB, DPS and TBS; and wherein  $R_6$  is selected from H, TBS, TMS, TIPS, PMBM and SEM.

51. A chemical compound according to claim 48 wherein  $R_1$ ,  $R_3$  and  $R_4$  are each methyl; wherein  $R_2$  is H or methyl; wherein  $R_5$  is selected from PMB, DPS and TBS; and wherein  $R_6$  is selected from H, TBS, TMS, TIPS, PMBM and SEM.

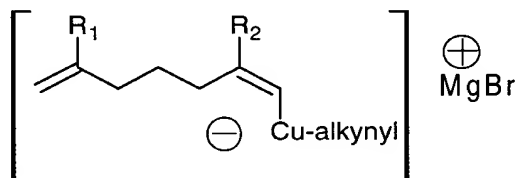
52. A chemical compound according to claim 51 wherein  $R_5$  is selected from TBS and DPS and wherein  $R_6$  is selected from TMS, TBS and PMB.

53. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

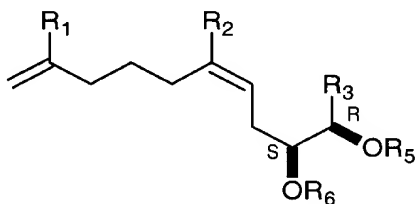
(a) reacting a first compound of a formula selected from:



and stereoisomers thereof, with a second compound of a formula:

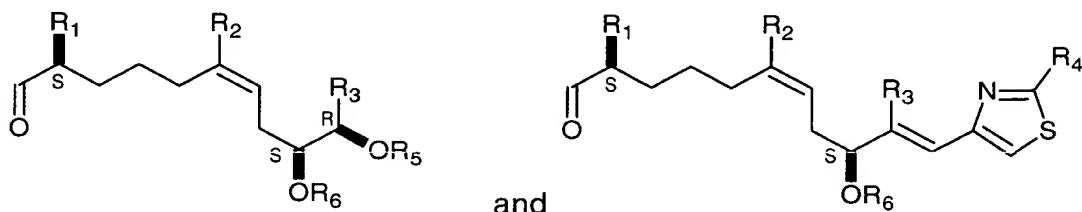


thereby to form a third compound of a formula selected from:



and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ , and  $R_3$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_5$  and  $R_6$  are each selected from H and a protecting group; and

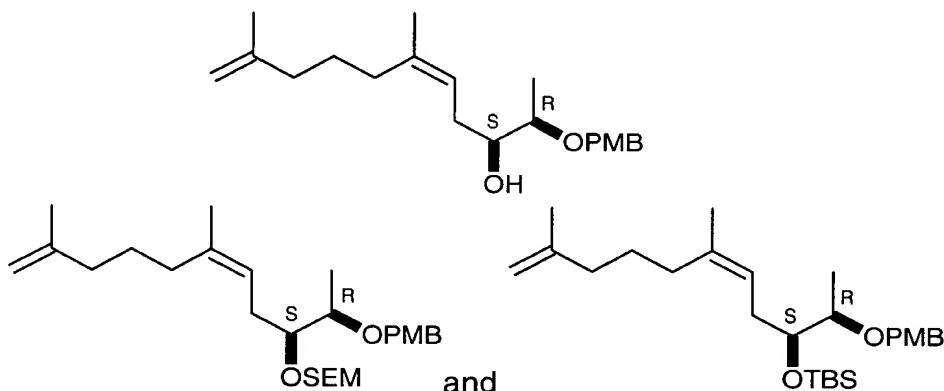
(b) converting said third compound into a fourth compound of a formula selected from:



and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_5$  and  $R_6$  are each selected from H and a protecting group.

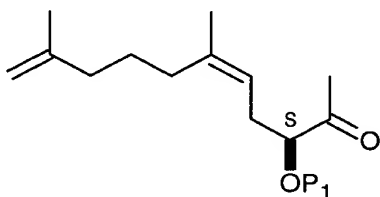
54. A method according to claim 53 wherein  $R_1$ ,  $R_3$  and  $R_4$  are each methyl; wherein  $R_2$  is H or methyl; wherein  $R_5$  is selected from PMB, DPS and TBS; and wherein  $R_6$  is selected from H, TBS, TMS, TIPS, PMBM and SEM.

55. A method according to claim 53 wherein said third compound is of a formula selected from:

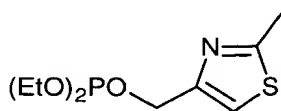


and stereoisomers thereof.

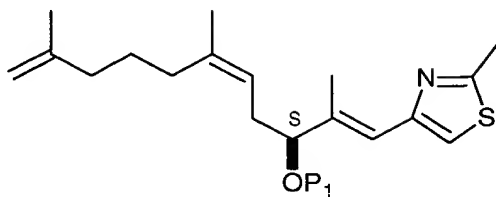
56. A method according to claim 55 wherein said third compound is further converted to a compound of formula:



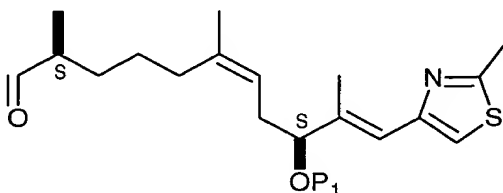
which is thereafter reacted with a compound of formula:



thereby to form a compound of formula:



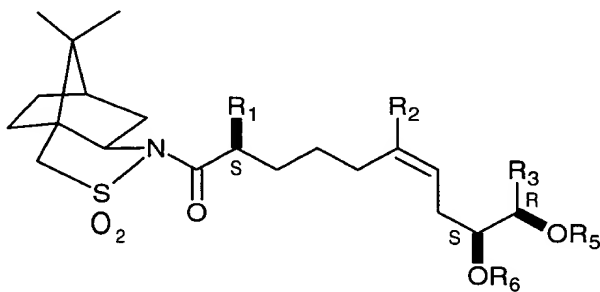
which is thereafter converted to said fourth compound of formula:



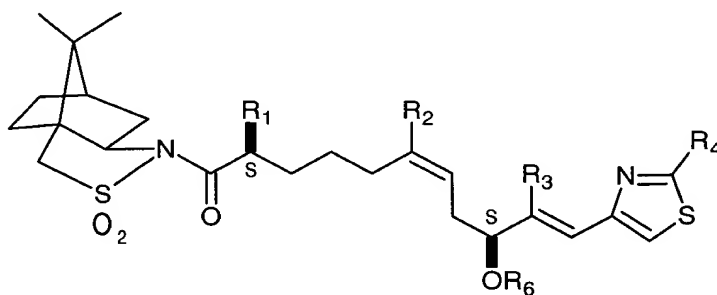
wherein  $P_1$  is selected from TBS and SEM.

57. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

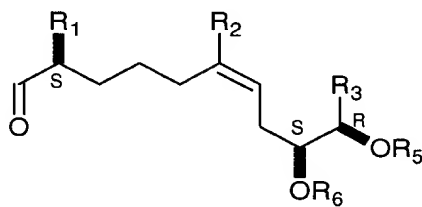
(a) converting a first compound of a formula selected from:



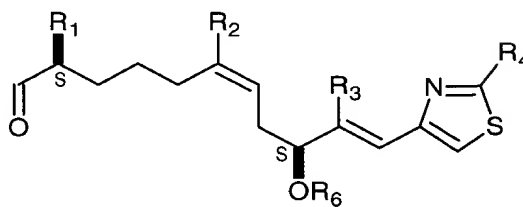
and



and stereoisomers thereof, to a second compound of a formula selected from

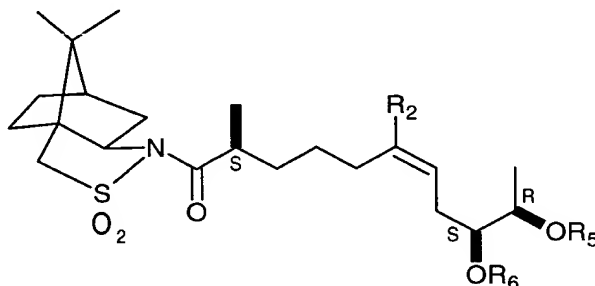


and



and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_5$  and  $R_6$  are each selected from H and a protecting group.

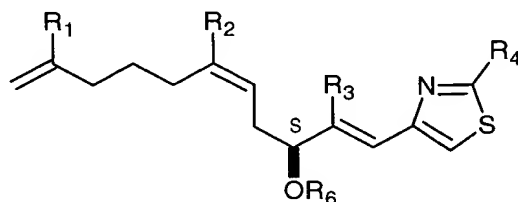
58. A method according to claim 57 wherein said first compound is of formula:



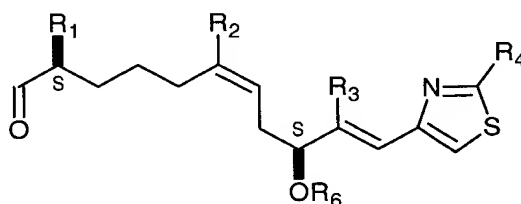
wherein  $R_2$  is selected from H and methyl,  $R_5$  is selected from TBS and DPS and wherein  $R_6$  is selected from TMS and TBS.

59. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

(a) converting a first compound of a formula:



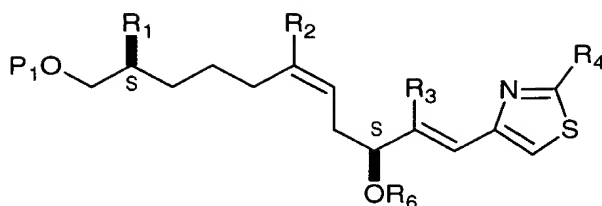
to a second compound of a formula selected from



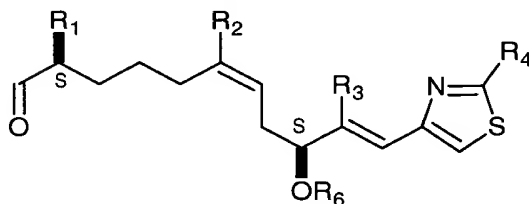
and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_6$  is selected from H and a protecting group.

60. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

(a) converting a first compound of a formula selected from:



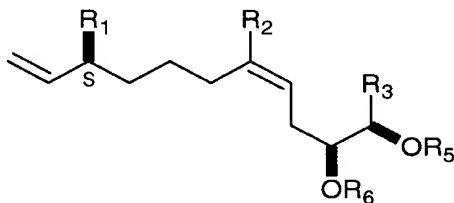
and stereoisomers thereof, to a second compound of a formula selected from



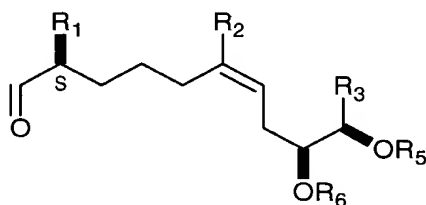
and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $P_1$  and  $R_6$  are each selected from H and a protecting group.

61. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

(a) converting a first compound of a formula selected from:

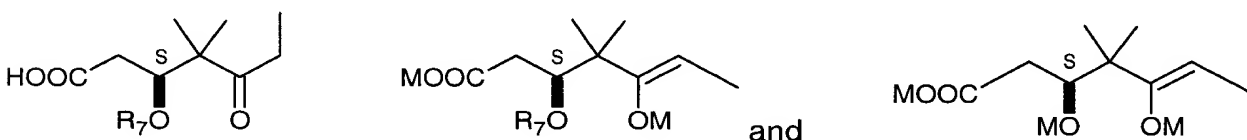


and stereoisomers thereof, to a second compound of a formula selected from



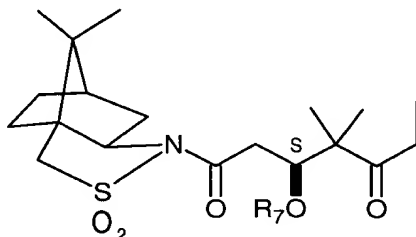
and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ , and  $R_3$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_5$  and  $R_6$  are each selected from H and a protecting group.

62. A chemical compound having a formula selected from:

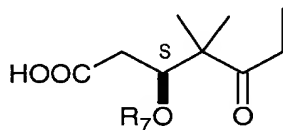


wherein M is an alkali metal and wherein  $R_7$  is selected from H and a protecting group.

63. A chemical compound according to claim 62 wherein M is Li.
64. A chemical compound according to claim 62 wherein R<sub>7</sub> is selected from H and TBS.
65. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising
- (a) converting a first compound of a formula:

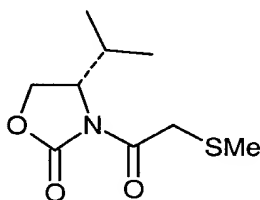


to a second compound of a formula:

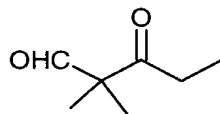


wherein R<sub>7</sub> is selected from H and a protecting group.

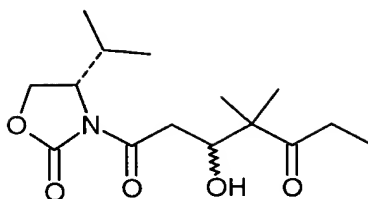
66. A method according to claim 65 wherein R<sub>7</sub> is TBS.
67. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising
- (a) reacting a first compound of a formula:



with a second compound of a formula:

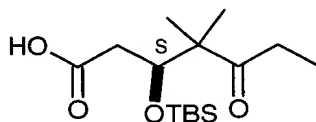


thereby to form a third compound of a formula:



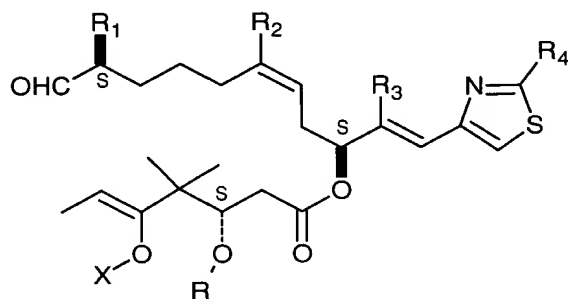
and

- (b) converting said third compound to a fourth compound of a formula:

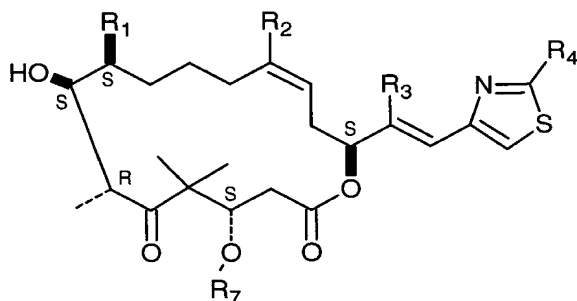


68. A process for use in producing epothilones and analogs and derivatives thereof, comprising:

- (a) converting a first compound of a formula selected from:

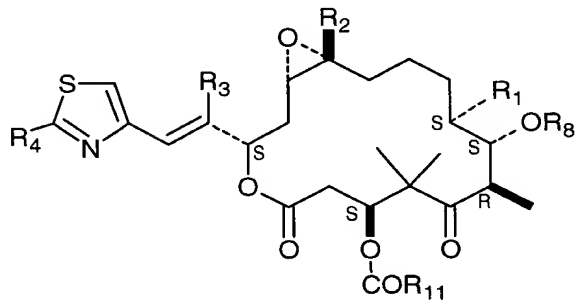
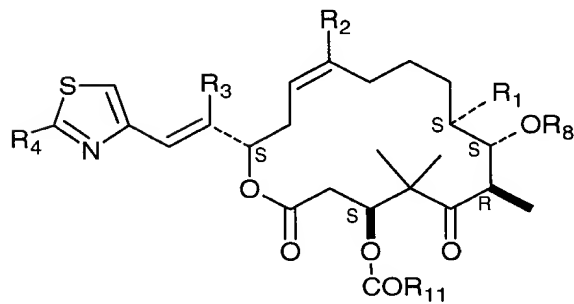
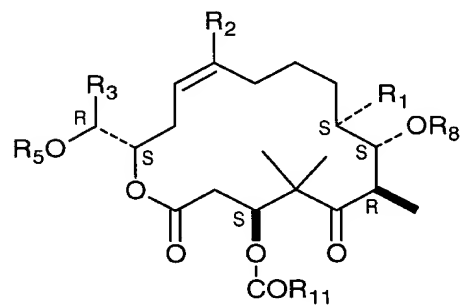
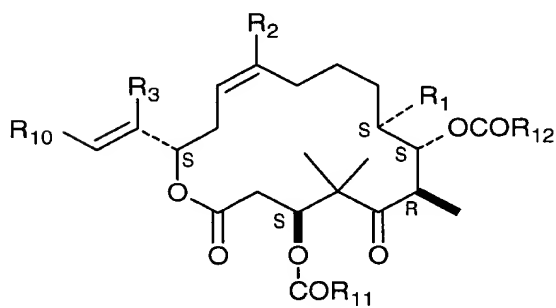
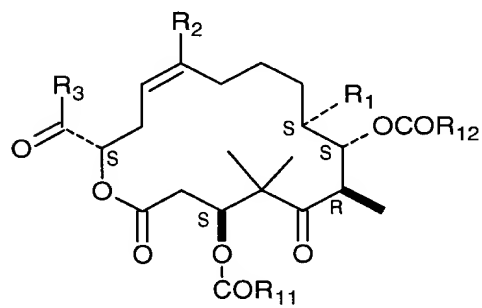
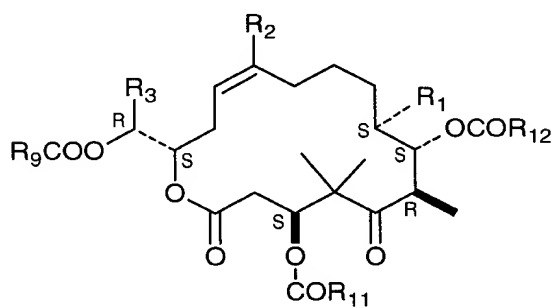
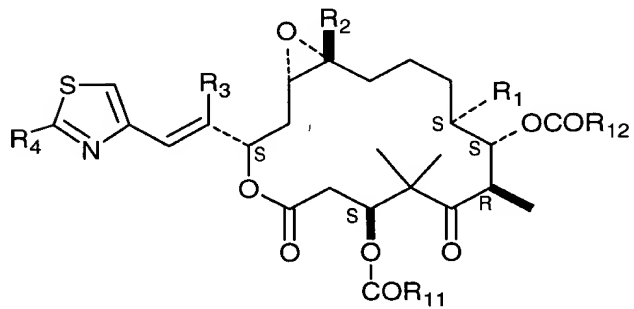
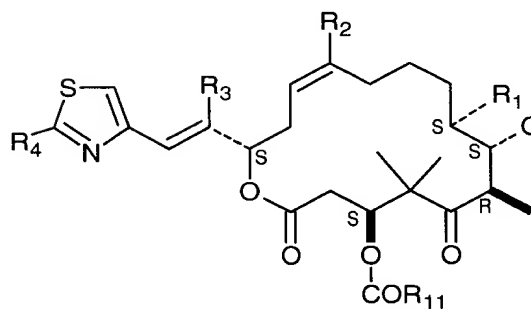
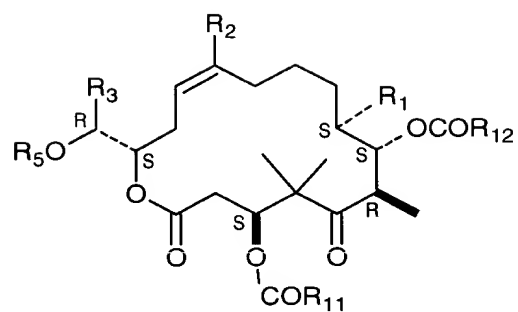
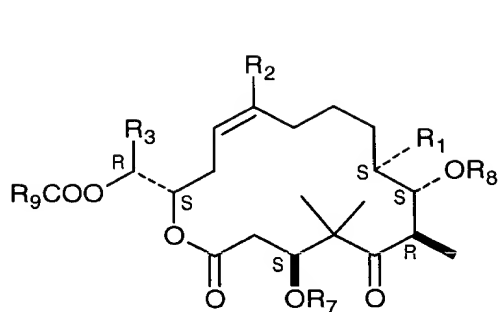


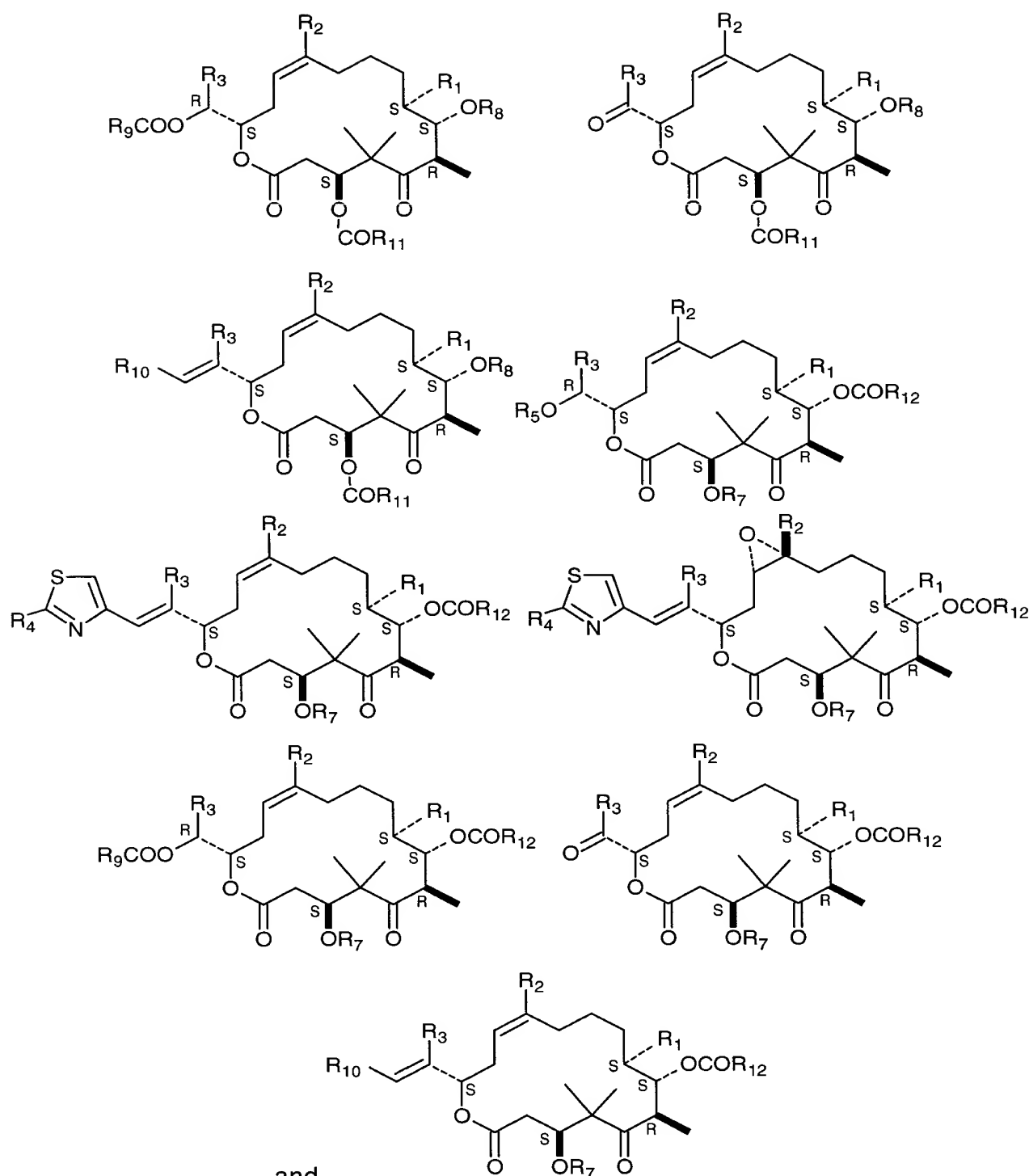
and stereoisomers thereof to a second compound of a formula selected from:



and stereoisomers thereof, wherein  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein  $R_7$  is selected from H and a protecting group.

69. A chemical compound having a formula selected from:





and stereoisomers thereof, wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub> and R<sub>8</sub> are each selected from H and a protecting group; wherein R<sub>9</sub> is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein

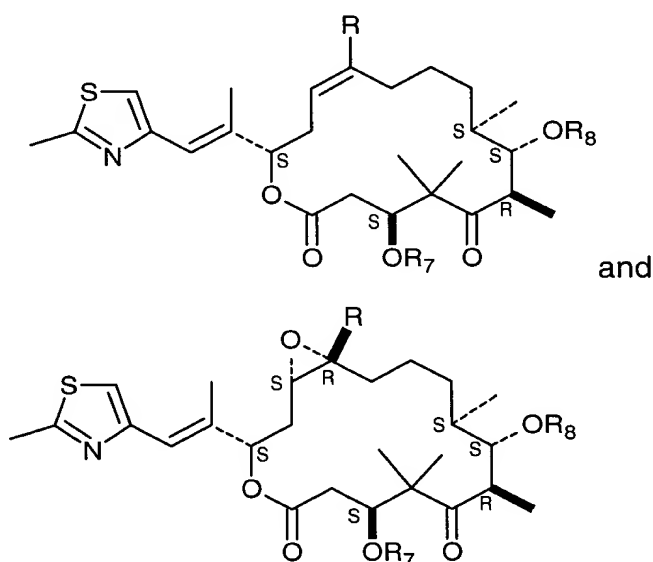
R<sub>10</sub> is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R<sub>11</sub> and R<sub>12</sub> are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

70. A chemical compound according to claim 69 wherein at least one of R<sub>11</sub> and R<sub>12</sub> is selected from  $-(CH_2)_xCH_3$  and  $-(CH_2)_yCH=CH_2$ , where x and y are integers.

71. A chemical compound according to claim 69 wherein x and y are selected from the integers 3 and 4.

72. A chemical compound according to claim 70 wherein x is 4 and y is 3.

73. A chemical compound having a formula selected from:



and stereoisomers thereof, wherein R is H or methyl, R<sub>7</sub> is H or COR<sub>11</sub>, R<sub>8</sub> is H or COR<sub>12</sub>, and wherein R<sub>11</sub> and R<sub>12</sub> are each selected from  $-(CH_2)_4CH_3$  and  $-(CH_2)_3CH=CH_2$ .